

61. (Amended) An isolated nucleic acid sequence comprising nucleotides 323 to 1255 of SEQ ID NO:1, or substitutions or variants thereof, wherein the nucleic acid substitutions or variants encode a polypeptide having 3-O-sulfotransferase activity.

62. (Amended) The isolated nucleic acid of claim 82, wherein the nucleic acid encodes a mature human 3-OST-1 protein comprising residues 21-307 of SEQ ID NO: 4.

63. (Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid encodes a mature murine 3-OST-1 protein comprising residues 21-311 of SEQ ID NO: 2.

64. (Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid comprises the nucleotide sequence of SEQ ID NO: 1.

65. (Amended) An isolated nucleic acid sequence having at least 70% nucleotide sequence identity with nucleotides 323 to 1255 of SEQ ID NO:1, wherein the nucleic acid sequence encodes a polypeptide having 3-O-sulfotransferase activity.

66. (Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid comprises a nucleotide sequence encoding residues 21-307 of SEQ ID NO: 2.

67. (Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid comprises a nucleotide sequence encoding residues 53-311, 21-52, or 260-269 of SEQ ID NO: 2.

68. (Amended) The isolated nucleic acid of claim 61, wherein the nucleic acid comprises a nucleotide sequence encoding residues 250-276 of SEQ ID NO: 2.

69. (Amended) The isolated nucleic acid of claim 82, wherein the nucleic acid comprises the nucleotide sequence of SEQ ID NO: 3.

70. (Amended) The isolated nucleic acid of claim 82, wherein the nucleic acid comprises a nucleotide sequence encoding residues 21-303 of SEQ ID NO: 4.

71. (Amended) The isolated nucleic acid of claim 82, wherein the nucleic acid comprises a nucleotide sequence encoding residues 49-307 of SEQ ID NO: 4.

72. (Amended) The isolated nucleic acid of claim 82, wherein the nucleic acid comprises a nucleotide sequence encoding residues 246-272 of SEQ ID NO: 4.

73. (Amended) A host cell transformed with a nucleic acid of any one of claims 61-72 and 77-89, or a descendant thereof.

74. (Amended) The host cell of claim 73, wherein the host cell is selected from the group consisting of bacterial cells, yeast cells, and insect cells.

75. (Amended) The host cell of claim 73, wherein the cell is a mammalian cell.

76. (Amended) The host cell of claim 73, wherein the cell is selected from the group consisting of COS-7 cells, CHO cells, murine primary cardiac microvascular endothelial cells (CME), murine mast cell line C57.1, human primary endothelial cells of umbilical vein (HUVEC), F9 embryonal carcinoma cells, rat fat pad endothelial cells (RFPEC), and L cells.

77. (New) The isolated nucleic acid of claim 65, wherein the nucleic acid sequence has at least 85% nucleotide sequence identity with nucleotides 323 to 1255 of SEQ ID NO: 1.

78. (New) An isolated nucleic acid comprising a nucleic acid sequence that encodes a polypeptide of SEQ ID NO: 2, or polypeptide variant thereof, wherein the polypeptide variant has 3-O-sulfotransferase activity.

79. (New) An isolated nucleic acid comprising a nucleic acid sequence that encodes a polypeptide of SEQ ID NO: 2.

80. (New) An isolated nucleic acid sequence comprising a nucleic acid sequence that encodes residues 53-311 of SEQ ID NO: 2, or polypeptide variant thereof, wherein the polypeptide variant has 3-O-sulfotransferase activity.

81. (New) An isolated nucleic acid comprising a nucleic acid sequence that encodes a polypeptide selected from the group consisting of residues 4-29, 144-152, 208-222, 31-42, 155-181, 72-94, 195-205, 278-293, 113-136, 56-66, 230-245, 301-306, and 101-107 of SEQ ID NO: 2.

82. (New) An isolated nucleic acid comprising nucleotides 119 to 1039 of SEQ ID NO:3, or substitutions or variants thereof, wherein the nucleic acid sequence substitutions or variants encode a polypeptide having 3-O-sulfotransferase activity.

83. (New) The isolated nucleic acid of claim 82, wherein the nucleic acid comprises the nucleotide sequence of SEQ ID NO: 3.

84. (New) An isolated nucleic acid sequence comprising a nucleic acid sequence that encodes residues 49-307 of SEQ ID NO: 4, or polypeptide variant thereof, wherein the polypeptide variant has 3-O-sulfotransferase activity.

85. (New) An isolated nucleic acid sequence having at least 70% nucleotide sequence identity with nucleotides 119 to 1039 of SEQ ID NO: 3, wherein the nucleic acid sequence encodes a polypeptide having 3-O-sulfotransferase activity.

86. (New) The isolated nucleic acid of claim 85, wherein the nucleic acid sequence has at least 85% nucleotide sequence identity with nucleotides 119 to 1039 of SEQ ID NO: 3.

87. (New) An isolated nucleic acid comprising a nucleic acid sequence that encodes a polypeptide of SEQ ID NO: 4, or polypeptide variant thereof, wherein the polypeptide variant has 3-O-sulfotransferase activity.